

WHAT IS CLAIMED IS:

1. A method for bending a glass sheet, wherein a preliminarily heated and softened glass sheet is pressed in a desired shape by an upper mold and a frame unit, the upper mold having a bending surface facing downward in a substantially vertical direction, and the frame unit having a bending surface facing upward in the substantially vertical direction so as to be engageable with the bending surface of the upper mold, comprising:

10 putting the heated and softened glass sheet on the bending surface of the frame unit to preliminarily bend the glass sheet by gravity before pressing the glass sheet by the upper mold and the frame unit, and using means for controlling an amount of preliminary bending to control deformation of the glass sheet caused by the preliminary bending; and

 pressing the preliminarily bent glass sheet by the upper mold and the frame unit.

2. The method according to Claim 1, comprising:

20 dropping the heated and softened glass sheet onto the frame unit to put the glass sheet thereon;

 conveying the glass sheet to a position just under the upper mold in such a state that the glass sheet is put on the frame unit; and

25 preliminarily bending the glass sheet in a shape approximate to the bending surface of the upper mold by using the means for controlling an amount of preliminary

bending to control the deformation of the glass sheet by gravity between just before putting the glass sheet on the frame unit and just before pressing the glass sheet.

3. The method according to Claim 2, comprising:

5 supporting the glass sheet in an air-floating fashion by an air-floating means and positioning the glass sheet; and

sticking and holding the positioned glass sheet by a sticking means and conveying the glass sheet to a position above the frame unit by the sticking means, the sticking means being brought near to the glass sheet from upward.

4. The method according to Claim 1, further comprising providing plural kinds of means for controlling an amount of preliminary bending, and selecting a desired means for controlling an amount of preliminary bending according to a type of the glass sheet to be bent.

5. An apparatus for bending a glass sheet, comprising an upper mold having a bending surface facing downward in a substantially vertical direction, and a frame unit having a bending surface facing upward in the substantially vertical direction so as to be engageable with the bending surface of the upper mold, whereby a preliminarily heated and softened glass sheet is pressed by the upper mold and the frame unit to be bent in a desired shape, further comprising:

means for controlling an amount of preliminary

bending to control deformation of the heated and softened glass sheet caused by the preliminary bending, the glass sheet being put on the frame unit

6. The apparatus according to Claim 5, further
5 comprising:

means for holding the heated and softened glass sheet and for dropping the glass sheet on the frame unit to put the glass sheet thereon; and

means for conveying the frame unit with the glass
10 sheet put thereon to a position just under the upper mold;

whereby the glass sheet is preliminarily bent in a shape approximate to the bending surface of the upper mold by using the means for controlling an amount of
15 preliminary bending to control the deformation of the glass sheet by gravity between just before putting the glass sheet on the frame unit and just before pressing the glass sheet.

7. The apparatus according to Claim 6, further
20 comprising:

an air-floating means for supporting the glass sheet in an air-floating fashion;

a positioning means for positioning the glass sheet supported in the air-floating fashion; and

25 a sticking means to be brought near to the positioned glass sheet from upward for sticking and holding the glass sheet and conveying the glass sheet to a position

above the frame unit.

8. The apparatus according to Claim 5, further comprising plural kinds of means for controlling an amount of preliminary bending, and a controller for
5 selecting a desired means for controlling an amount of preliminary bending according to a type of the glass sheet to be bent.

9. The apparatus according to Claim 5, wherein the means for controlling an amount of preliminary bending
10 comprises a lower mold having the bending surface facing upward in the substantially vertical direction and provided on an inner peripheral side of the frame unit; the bending surface of the lower mold has a plurality of holes formed therein to communicate with an air suction
15 means; whereby air is sucked through the holes by the air suction means to accelerate the preliminary bending of the glass sheet.

10. The apparatus according to Claim 5, wherein the means for controlling an amount of preliminary bending
20 comprises a heater for heating a desired portion of the glass sheet put on the frame unit, whereby the desired portion of the glass sheet conveyed along with the frame unit is heated by the heater to accelerate the preliminary bending of the glass sheet.

25 11. The apparatus according to Claim 5, wherein the means for controlling an amount of preliminary bending comprises a sticking means with a heater incorporated

thereinto, whereby a desired portion of the heated and softened glass sheet is heated to accelerate the preliminary bending of the glass sheet while the glass sheet is stuck and held by the sticking means.

5 12. The apparatus according to Claim 5, wherein the means for controlling an amount of preliminary bending comprises an air-floating means with a heater incorporated thereinto, whereby a desired portion of the heated and softened glass sheet is heated to accelerate
10 the preliminary bending of the glass sheet while the glass sheet is supported in the air-floating fashion by the air-floating means.

13. The apparatus according to Claim 5, wherein the means for controlling an amount of preliminary bending
15 comprises a frame unit including a fixed frame and a movable frame pivoted on the fixed frame, whereby the movable frame is tilted about a portion of the fixed frame unit with the movable frame pivoted thereon to raise an end of the heated and softened glass sheet,
20 accelerating the preliminary bending of the glass sheet.

14. The apparatus according to Claim 5, wherein the means for controlling an amount of preliminary bending comprises an outer frame unit including a fixed frame and a movable frame pivoted on the fixed frame, and an inner
25 frame/flat member provided on an inner peripheral side of the outer frame unit and having a flatter shape than the outer frame unit;

whereby the heated and softened glass sheet is transferred onto the outer frame unit after having been put on the inner frame/flat member, and the movable frame is tilted about a portion of the fixed frame unit with
5 the movable frame pivoted thereon to raise an end of the heated and softened glass sheet, accelerating the preliminary bending of the glass sheet.

15. The apparatus according to Claim 5, wherein the upper mold, the frame units and the means for controlling
10 an amount of preliminary bending are provided in a heating furnace.

16. The apparatus according to Claim 5, wherein the bending surface of the upper mold has a plurality of holes formed therein, and the holes are connected to an
15 air supply/exhaustion means.